

In the Claims:

Listing of all claims:

1-47 (Cancelled.)

1 48. (New) An apparatus for welding by
2 depositing drops of molten metal at the end of a
3 consumable welding wire into a weld puddle by short
4 circuit transfer welding, comprising:
5 a power source having a first waveform during a
6 short condition and a second waveform during an arc
7 condition as an output, wherein the output is in
8 electrical communication with the welding wire;
9 a feedback circuit, for providing a signal
10 indicative of the output being in the short or the arc
11 condition;
12 a controller, coupled to the feedback circuit,
13 and having a control output provided to the power source,
14 wherein the control output commands the first waveform to
15 be a current waveform and the second waveform to be a
16 voltage waveform.

1 49. (New) The apparatus of claim 48, wherein
2 the feedback circuit includes a comparator.

1 50. (New) The apparatus of claim 49, wherein
2 the comparator receives a threshold voltage and a signal
3 responsive to output voltage as inputs.

1 51. (New) The apparatus of claim 48, wherein
2 the feedback circuit includes as an output a real-time signal
3 indicative of the heat input to each drop.

1 52. (New) The apparatus of claim 51, wherein
2 the controller controls the first and second waveforms to
3 provide a desired mass deposition rate responsive to a wire
4 feed speed and a distance from a tip of the wire to the
5 workpiece.

1 53. (New) The apparatus of claim 52, wherein
2 the feedback circuit has an output current feedback signal and
3 an output voltage feedback signal provided to the controller,
4 and wherein the controller controls the first waveform in
5 response to the output current feedback signal and the second
6 waveform in response to the arc voltage feedback signal.

1 54. (New) The apparatus of claim 48, wherein
2 the feedback circuit has an output current feedback signal and
3 an output voltage feedback signal provided to the controller,
4 and wherein the controller controls the first waveform in
5 response to the output current feedback signal and the second
6 waveform in response to the arc voltage feedback signal.

1 55. (New) An apparatus for welding by
2 depositing drops of molten metal at the end of a
3 consumable welding wire into a weld puddle by short
4 circuit transfer welding, comprising:
5 power means for providing power in the form of
6 a first waveform during a short condition and a second
7 waveform during an arc condition to the welding wire;
8 feedback means for providing a signal
9 indicative of the output being in the short or the arc
10 condition;
11 control means for controlling the power means
12 in response to the feedback means, wherein the power
13 means is controlled such that the first waveform is a

14 current waveform and the second waveform is a voltage
15 waveform.

1 56. (New) The apparatus of claim 55, wherein
2 the feedback means includes a means for comparing two signals.

1 57. (New) The apparatus of claim 56, wherein
2 the comparator means receives a threshold voltage and a signal
3 responsive to output voltage as inputs.

1 58. (New) The apparatus of claim 56, wherein
2 the feedback means includes means for providing a real-time
3 signal indicative of the heat input to each drop.

1 59. (New) The apparatus of claim 57, wherein
2 control means includes means for controlling the first and
3 second waveforms to provide a desired mass deposition rate
4 responsive to a wire feed speed and a distance from a tip of
5 the wire to the workpiece.

1 60. (New) The apparatus of claim 55, wherein
2 the feedback means provides an output current feedback signal
3 and an output voltage feedback signal provided to the control
4 means, and wherein the control means includes means for
5 controlling the first waveform in response to the output
6 current feedback signal and the second waveform in response to
7 the arc voltage feedback signal.

1 61. (New) A method of short circuit welding,
2 comprising:
3 providing power in the form of a first waveform
4 during a short condition and a second waveform during an
5 arc condition to a welding wire;

6 providing a feedback signal indicative of the
7 output being in the short or the arc condition;
8 controlling the power in response to the
9 feedback such that the first waveform is a current
10 waveform and the second waveform is a voltage waveform.

1 62. (New) The method of claim 61, further
2 comprises comparing two signals.

1 63. (New) The method of claim 62, wherein
2 comparing includes comparing a threshold voltage and a signal
3 responsive to output voltage.

1 64. (New) The method of claim 61, further
2 comprising providing a real-time signal indicative of the heat
3 input to each drop.

1 65. (New) The method of claim 60, further
2 comprising controlling the first and second waveforms to
3 provide a desired mass deposition rate responsive to a wire
4 feed speed and a distance from a tip of the wire to the
5 workpiece.

1 66. (New) The method of claim 63, further
2 comprising providing an output current feedback signal and an
3 output voltage feedback signal to the control means, and
4 controlling the first waveform in response to the output
5 current feedback signal and the second waveform in response to
6 the arc voltage feedback signal.

1 67. (New) The method of claim 63, further
2 comprising providing an output current feedback signal and an
3 output voltage feedback signal to the control means, and
4 controlling the first waveform in response to the output

- 5 current feedback signal and the second waveform in response to
- 6 the arc voltage feedback signal.